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## GENERAL NOTES ON THE LEPIDOPTERA OF THE CANAL ZONE, ISTHMUS OF PANAMA.

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The Heliconidæ seem to be more numerous in species and individuals than any other family of Rhopholocera on the Isthmus and their presence in the dense jungles and forest groves adds a charm of color to the prevailing green. They are seldom seen in the open except on flowering shrubs along the trails. From about the summer solstice to middle December in the rainy season they are very numerous on the wing but adults are found throughout the year.

The tailless *Papilios* are found in about the same dense jungle as the Heliconidæ, favoring more, perhaps, the water courses. Their bright spots of sharp colors are very conspicuous when they fly about in the drizzling rains. They are seldom seen on the wing in the dry season.

The *Caligos* are not commonly seen as they choose the thickets of vine-tangled shrubbery for their short, lumbering flights, but they are found on the wing throughout the year.

The conspicuous *Morphos* are very local and are seldom seen except during November and early December. In certain localities on the wide trails as many as ten to twenty of the *Morpho cypris* can be seen from dawn to about mid-forenoon, flying high and wild. The other *Morphos* fly lower and more steady and are easily attracted by bits of sugar cane.

The Erycinidæ are seen at all times of the year and are generally found along the open trails, resting on the flowers or leaves of shrubs in the sunlight. They seldom fly in the thick jungle.

In the cut-over areas and open sabannas are found many of the Hesperidæ and Pieridæ, the latter seem to favor congregating around damp patches of ground as they do in other parts of the world. The more common species found in the open fields are the *Anarta fatima*, *Anarta jatrophaea* and a species or two of *Junonia*.

In the groves around Ancon Hill, *Ageronia feronia* is very noticeable when flying about making a snapping noise, which can be heard several yards.

On the hill tops on the hot fair days from about ten o'clock in the morning until about one hour after noon, the flowering shrubs are surrounded by hundreds of butterflies and day-flying moths of numerous species. Many species are usually found at rest only on these hill tops and this is especially true of the tailed *Papilios* with the exception of a species similar to the *Papilio marcellus* which is occasionally seen resting on damp patches of ground in the low lands.

This predilection for the hill tops by certain species among the Lepidoptera is a strange manifestation of their habits of migration.

Perhaps the most striking and spectacular feature in the habits of the Lepidoptera on the Isthmus of Panama, in fact among all insect life in this region, is the occasional marvelous migration of *Uranus fulgens*. During June and July in 1907 this diurnal, asymmetric moth migrated across the Isthmus in a general easterly direction in vast numbers. Group counting indicated that the daily number which passed amounted to hundreds of thousands. They flew no higher than ten feet except at obstructions and the maximum occurred from dawn until about eight o'clock in the morning and from four o'clock in the afternoon until dusk, with a few thousand stragglers during the other daylight hours. They flew along special courses in a rapid, long zig-zag manner and the migration was not interrupted by the rains. Of the millions that passed I only observed one at rest and that was on a leaf. In 1908 and 1909 the migration was limited to a few thousand individuals beginning in late May and extending through June and into July with the same characteristics as the 1907 flight. In 1915 there was another enormous migration but not equal to the number in 1907, but having the same characteristics as to the routes, time, manner of flight and the absence of resting individuals. During these migrations *Uranus fulgens* was observed simultaneously at all points on the Canal Zone and there were about an equal number of males and females.

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## BOOK REVIEWS.

ORTHOPTERA OF NORTHEASTERN AMERICA WITH ESPECIAL REFERENCE TO THE FAUNAS OF INDIANA AND FLORIDA. BY W. S. BLATCHLEY. The Nature Publishing Company, Indianapolis, 1920. 784 pp., 7 plates, 246 text figures, bibliography, glossary, index to synonyms